MITSUBISHI

Q68DAV, Q68DAI
D/A Converter Module

Thank you for buying the Mitsubishi general-purpose programmable logic controller MELSEC Q Series.

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

User's Manual (Hardware)

MELSEC-Q
Mitsubishi Programmable Logic Controller

MODEL	Q- 68D/A -U-H-JE
MODEL Number	13JT24

IB-0800151-A (0012) MEE

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● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in the manual. Also pay careful attention to safety and handle the module properly.
These precautions apply only to Mitsubishi equipment. Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.
These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".

⚠DANGER	**Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.**
⚠CAUTION	**Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.**

Depending on circumstances, procedures indicated by ⚠**CAUTION** may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 100 mm (3.94 inch) or more from each other.
  Not doing so could result in noise that may cause malfunction.

[INSTALLATION PRECAUTIONS]

⚠CAUTION

- Use the PLC in an environment that meets the general specifications given in the User's Manual of the CPU module being used.
  Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
- When installing the module, securely insert the module fixing tabs into the mounting holes of the base unit while pressing the installation lever located a t the bottom of the module downward. Improper installation may result in malfunction , breakdown or the module coming loose and dropping.
  Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not doing so may cause damage to the module.
- Do not directly touch the conductive area or electronic components of the module.
  Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

⚠CAUTION

- Always ground the FG terminal for the PLC.
  There is a risk of electric shock or malfunction.
- When turning on the power and operating the module after wiring is completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Tighten the terminal screws within the range of specified torque.
  If the terminal screws are loose, it may result in short circuits or malfunction.
  If the terminal screws are tightened too much, it may cause damage to the screw and/or the module, resulting in short circuits or malfunction.
- Be careful not to let foreign matters such as sawdust or wire chips get inside the module.
  These may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when wiring.
  Do not remove this film until the wiring is complete.
  Before operating the system, be sure to remove the film to provide adequate heat ventilation.

About This Manual

The following manuals are also related to this product. Order them if necessary.

Related Manual

Manual Name	Manual No. (Model code)
D/A Converter Module User's Manual	SH-080054 (13JR02)

Conformation to the EMC Directive and Low Voltage Instruction

When complying with EMC Directives and Low-Voltage Directives by assembling a Mitsubishi PLC compatible with EMC Directive and Low-Voltage Directives into the user product, refer to Chapter 3 "EMC Directives and Low-Voltage Directives" in the User's Manual (Hardware Section) for the CPU module being used. The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

1. Overview

This manual explains specifications and the names of the components for the Q68DAV type D/A converter module (hereafter Q68DAV) and the Q68DAI type D/A converter module (hereafter Q68DAI) which are used in combination with the MELSEC-Q Series CPU module. In this manual, both the Q68DAV and Q68DAI are referred to as D/A converter modules.
After unpacking, confirm that the following products are enclosed.

Part name	Qty.
Q68DAV/Q68DAI Model Digital-Analog module	1
FG terminal L-shaped metal fitting	1

2. Specifications

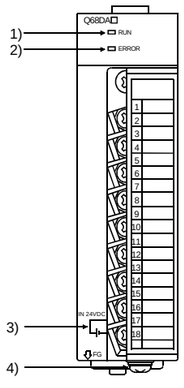
The specifications for the D/A converter module are shown in the following table. For general specifications, refer to the operation manual for the CPU module being used.

Item \ Type			Q68DAV				Q68DAI		
Number of analog outputs			8 points (8 channels)						
Digital input			16-bit signed binary (normal resolution mode: –4096 to 4095, high resolution mode:–12288 to 12287, –16384 to 16383)				16-bit signed binary (normal resolution mode: –4096 to 4095, high resolution mode:–12288 to 12287)		
Analog output			– 10 to 10V DC (External load resistance 1 k Ω to 1 M Ω)				0 to 20 mA DC (External load resistance 0 Ω to 600 Ω)		
I/O characteristics maximum resolution			Analog output range				Analog output range		
			0 to 5 V	1 to 5 V	– 10 to 10 V	Users range setting	0 to 20 mA	4 to 20 mA	Users range setting
	Normal resolution mode	Digital input value	0 to 4000		– 4000 to 4000		0 to 4000		– 4000 to 4000
		Maximum resolution	1.25 mV	1.0 mV	2.5mV	0.75mV	5 μ A	4 μ A	1.5 μ A
	High resolution mode	Digital input value	0 to 12000		– 16000 to 16000	– 12000 to 12000	0 to 12000		– 12000 to 12000
		Maximum resolution	0.416 mV	0.333 mV	0.625 mV	0.333 mV	1.66 μ A	1.33 μ A	0.83 μ A
Accuracy (Accuracy in respect to maximum analog output value)		Ambient temperature 25 ± 5 °C	Within ± 0.1 % (Voltage : ± 10mV, Current : ± 20μA)						
		Ambient temperature 0 to 55 °C	Within ± 0.3 % (Voltage : ± 30mV, Current : ± 60μA)						
Conversion speed			80 μ s/ channel						

Item \ Type	Q68DAV	Q68DAI
Absolute maximum output	± 12 V	21 mA
Output short circuit protection	Available	
Insulation method	Between I/O terminal and PLC power supply : Photocoupler insulation Between output channels : Not insulated Between external supply power and analog output : Not insulated	
Number of occupied points	16 points	
Connecting terminals	18 points terminal block	
Applicable wire size	0.3 to 0.75 mm^2	
Applicable solderless terminals	Other terminals than FG:R1.25 - 3 (A solderless terminals with sleeves cannot be used) FG terminal:R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A	
External supply power	24 V DC + 20 %, – 15 %	
	Ripple, spike within 500 mVP-P	
	Inrush current : 3.3A, within 70μs	Inrush current : 3.1A, within 75μs
Internal current consumption (5 V DC)	0.19 A	0.28 A
	0.39 A	0.38 A
Weight	0.18 kg	

3. Part Names

This section explains the names of the components for the D/A converter module.



Terminal number	Signal name			
	Q68DAV		Q68DAI	
1	CH.1	V+	CH.1	I+
2		COM		COM
3	CH.2	V+	CH.2	I+
4		COM		COM
5	CH.3	V+	CH.3	I+
6		COM		COM
7	CH.4	V+	CH.4	I+
8		COM		COM
9	CH.5	V+	CH.5	I+
10		COM		COM
11	CH.6	V+	CH.6	I+
12		COM		COM
13	CH.7	V+	CH.7	I+
14		COM		COM
15	CH.8	V+	CH.8	I+
16		COM		COM
17	24 V			
18	24 G			

Number	Name	Description
1)	RUN LED	Displays the operating status of the D/A converter module. On : Normal operation Flashing : During offset/gain setting mode Off : 5V power supply interrupted or watch dog timer error
2)	ERROR LED	Displays the error status of the D/A converter module. On : Error Off : Normal operation Flashing : Error in switch settings Switch No. 5 of the intelligent function module has been set to a value other than "0".
3)	External power supply terminal	This is the terminal for connecting the 24 V DC external power supply.
4)	FG terminal	Terminal for frame ground

4. Handling Precautions

(1) Do not drop the module or cause it to receive strong impact.
(2) Tighten the terminal screws for the module to the specified torque shown below. Insufficient tightening torque could result in shorts, failures or malfunction.

Screw location	Tightening torque
Module mounting screw (M3 screw)	36 to 48 N · cm
Terminal block terminal screw (M3 screw)	42 to 58 N · cm
Terminal block mounting screw (M3.5 screw)	66 to 89 N · cm
FG terminal screw (M3 screw)	42 to 58 N · cm

5. Wiring

5.1 Wiring precautions

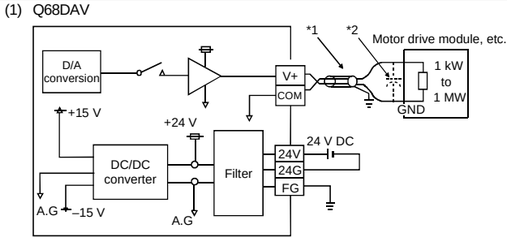
(1) Use separate cables for the external output signal or external power supply for the AC and D/A converter modules. Take steps to prevent the AC side from being affected by surge or inductance.
(2) Ground one point of the shield for shielded wires or shielded cables.

Point

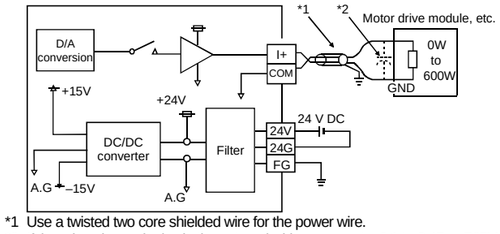
If it is difficult to wire FG terminals due to the limited installation space, use FG terminal L-shaped metal fitting.

5.2 External wiring

(1) Q68DAV



(2) Q68DAI



*1 Use a twisted two core shielded wire for the power wire.
*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47 m F25V condenser between the V+/I+ terminal and COM.

5.3 Switch setting for intelligent functional module

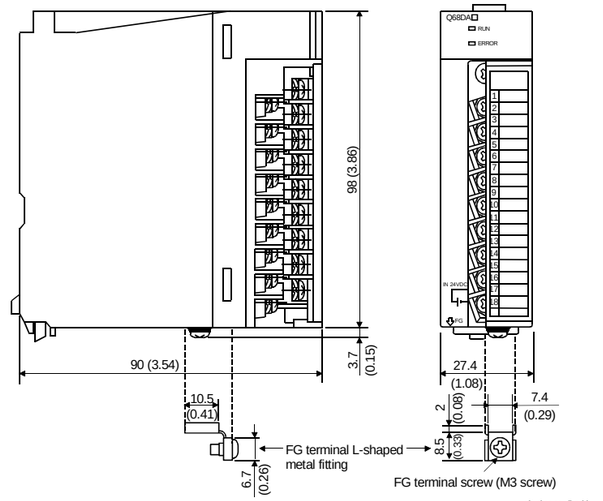
The settings for the intelligent function module are performed using the I/O allocation settings for the GX Developer. It can be easy to set by inputting using hexadecimal-4 digits.

	Setting
Switch 1	Output range setting (CH.1 to CH.4) CH4 CH3 CH2 CH1 H
Switch 2	Output range setting (CH.5 to CH.8) CH8 CH7 CH6 CH5 H
Switch 3 *2	b15 b8 b7 b6 b5 b4 b3 b2 b1 b0 0 to 0 CH8 CH7 CH6 CH5 CH4 CH3 CH2 CH1 HOLD/CLEAR function setting 0 : CLEAR 1 : HOLD
Switch 4	H 00H : Normal mode (non-synchronized) 01 to FFH : Synchronized output mode 0H :Normal resolution mode 1 to FH : High resolution mode 0H : Normal mode (D/A conversion processing) 1 to FH : Offset/gain setting mode
Switch 5	0 : Fixed

Analog output range	Output range setting value
4 to 20 mA	0 H *1
0 to 20 mA	1 H
1 to 5 V	2 H
0 to 5 V	3 H
– 10 to 10 V	4 H
User range setting	F H

Output range setting value can be set within the ranges described below depending on the D/A converter module's model name.
• Q68DAV .....0H, 2H to 4H, FH
*1: The module activates at the analog output range within 1 to 5V, when 0H is set.
• Q68DAI .....0H, 1H, FH
*2: Switch 3 is set at decimal unit.
Setting is comparatively easier when the input type is change to decimal.

6. External Dimensions



Warranty

Mitsubishi Electric shall not be liable for any loss caused by reasons for which Mitsubishi is not held accountable, lost business opportunities or unrealized gain on the customer's side resulting from failure of the product, or any other damage, secondary disaster, accident, damage to equipment other than the product or disruption of other business operations arising out of special circumstances which may or may not have been predicted at Mitsubishi.

⚠ For safe use of the product

- This product is manufactured as a general-purpose product intended for general industrial use only. It is not designed nor manufactured for use in an equipment or system affecting human lives.
- If you are considering to use this product in equipment or systems for nuclear power generation, power generation, aerospace, medical or passenger transport applications, consult our sales representatives.
- This product is manufactured under our strict quality control system. However, if the product is used in the intended facility in such a way that a failure of the product may lead to serious accident or loss, incorporate backup or fail-safe functions into the system design.

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